4 UIC

EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

UNDERGROUND INJECTION CONTROL PERMIT APPLICATION

(Collected under the authority of the Safe Drinking Water Act, Sections 1421, 1422, 40 CFR 144)

I. EPA ID NUMBER

	T/A	C
U		

READ ATTACHED INSTRUCTIONS BEFORE STARTING

FOR OFFICIAL USE ONLY

Application approved mo day year	Date Received mo day year	Permit/Well Number	Comments
		EPU 59-D	

II. FACILITY NAME AND ADDRESS

Facility Name: East Poplar Unit

Street Address: P. O. Box 547

City: Poplar | State: MT | ZIP Code: 59255

III. OWNER/OPERATOR AND ADDRESS

Owner/Operator Name: Murphy Oil USA, Inc.

Street Address: 200 Peach Street

City: El Dorado | State: AR | ZIP Code: 71730

IV. OWNERSHIP STATUS (Mark 'x')

☐ A. Federal ☐ B. State ☒ C. Private

☐ D. Public ☐ E. Other (Explain)

V. SIC CODES

1311

VI. WELL STATUS (Mark 'x')

☒ A. Operating — Date Started: mo 6, day 11, year 61

☒ B. Modification/Conversion ☐ C. Proposed

Permitting Existing Well Approved by Rule

VII. TYPE OF PERMIT REQUESTED (Mark 'x' and specify if required)

☒ A. Individual ☐ B. Area

Number of Existing wells:

Number of Proposed wells:

Name(s) of field(s) or project(s): East Poplar Unit

VIII. CLASS AND TYPE OF WELL (see reverse)

A. Class(es) (enter code(s))	B. Type(s) (enter code(s))	C. If class is "other" or type is code 'x,' explain	D. Number of wells per type (if area permit)
11-D			

IX. LOCATION OF WELL(S) OR APPROXIMATE CENTER OF FIELD OR PROJECT

	A. Latitude Deg	Min	Sec	B. Longitude Deg	Min	Sec	Township and Range Twsp	Range	Sec	¼ Sec	Feet from	Line	Feet from	Line
I							28N	51E	4	NW	1911	N	732'	W

X. INDIAN LANDS (Mark 'x')

☒ Yes ☐ No

XI. ATTACHMENTS

(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)

FOR CLASSES I, II, III (and other classes) complete and submit on separate sheet(s) Attachments A — U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application: A, E, G, H, M, Q, R, and U.

XII. CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

A. Name and Title (Type or Print): GLENN M. FEDDERSON Vice President

Deel Form

B. Phone No. (Area Code and No.): 501/862-6411

C. Signature

D. Date Signed: 12/4/84

Form Approved. OMB No. 2000-0042
Approval expires 9-30-86

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

EPA

COMPLETION FORM FOR INJECTION WELLS

ADMINISTRATIVE INFORMATION

1. Permittee

Murphy Oil USA, Inc.

Address *(Permanent Mailing Address) (Street, City, State, and ZIP Code)*

P. O. Box 547, Poplar, Montana 59255 (District Office)
200 Peach Street, El Dorado, Arkansas 71730 (Home Office)

2. Operator

Murphy Oil USA, Inc.

Address *(Street, City, State, and ZIP Code)*

Same as above

3. Facility Name

East Poplar Unit 59-D

Telephone Number

District Office 406-768-3611
Home Office 501-862-6411

Address *(Street, City, State, and ZIP Code)*

Murphy Oil USA, Inc. (District Office)
P. O. Box 547
Poplar, Montana 59255

4. Surface Location Description of Injection Well(s)

State	County
Montana	Roosevelt

¼ of	¼ of	¼ section
	SW	NW 4

Township	Range
28N	51E

Feet from (N/S)	Line of quarter section and
1911	N

Feet from (E/W)	Line of quarter section
732'	W

Submit with this Completion Form the attachments listed in *Attachments for Completion Form.*

CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32).

NAME AND OFFICIAL TITLE *(Please type or print)*	SIGNATURE	DATE SIGNED
GLENN M. FEDDERSON Vice President		12/4/84

Form

EPA Form 7520-9 (2-84)

CONTINUED ON REVERSE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

EPA

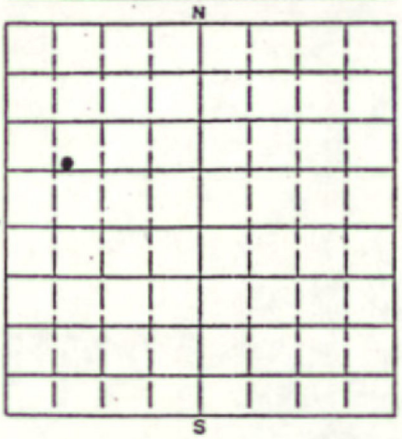
COMPLETION REPORT FOR BRINE DISPOSAL, HYDROCARBON STORAGE, OR ENHANCED RECOVERY WELL

Form Approved
OMB No. 2040-0042
Approval expires 9-30-86

NAME AND ADDRESS OF EXISTING PERMITTEE
Murphy Oil USA, Inc.
200 Peach St.
El Dorado, AR 71730
EPU 59-D

NAME AND ADDRESS OF SURFACE OWNER
Submarginal Land
BIA
Poplar, Montana

LOCATE WELL AND OUTLINE UNIT ON SECTION PLAT — 640 ACRES



STATE	COUNTY	PERMIT NUMBER
MT	Roosevelt	

SURFACE LOCATION DESCRIPTION
NE ¼ OF SW ¼ OF NW ¼ SECTION 4 TOWNSHIP 28 N RANGE 51E

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT
Surface Location 1911 ft. from (N/S) N Line of quarter section
and 732 ft. from (E/W) W Line of quarter section

WELL ACTIVITY
- [X] Brine Disposal
- [ ] Enhanced Recovery
- [ ] Hydrocarbon Storage

TYPE OF PERMIT
- [X] Individual
- [ ] Area

Number of Wells 1

Estimated Fracture Pressure of Injection Zone 2444 psig

Anticipated Daily Injection Volume (Bbls)		Injection Interval	
Average	Maximum	Feet	to Feet
Not In Use		3264	3342

Anticipated Daily Injection Pressure (PSI)		Depth to Bottom of Lowermost Freshwater Formation (Feet)
Average	Maximum	Bud Lien's Deepest Well is 86'

Type of Injection Fluid *(Check the appropriate block(s))*
- [X] Salt Water
- [ ] Brackish Water
- [ ] Fresh Water
- [ ] Liquid Hydrocarbon
- [ ] Other

Lease Name: EPU
Well Number: 59-D
Name of Injection Zone: Dakota Sand

Date Drilling Began: 6-23-55
Date Well Completed: 8-8-55
Date Drilling Completed: 7-16-55

Permeability of Injection Zone: Data Not Available
Porosity of Injection Zone: Data Not Available

CASING AND TUBING			CEMENT		HOLE	
OD Size	Wt/Ft — Grade — New or Used	Depth	Sacks	Class	Depth	Bit Diameter
13 3/8	48# H-40 New	145.85 '	200	G?	150'	17½
9 5/8	36# H-40 New	948.83 '	400	G?	965'	12¼
5 1/2	15.5# J-55 New	5741.36'	300	G?	5754'	8 3/4
	Block Squeeze		450	G?	3149' & 3400'	
2 7/8	6.5# J-55 New	3160'				

INJECTION ZONE STIMULATION		WIRE LINE LOGS, LIST EACH TYPE	
Interval Treated	Materials and Amount Used	Log Types	Logged Intervals
3264-3365	1500 gals mud acid	Elect Survey 2"	962' - 5753'
		Elect Survey 5"	2000'-5753'
		Microlog 5"	2000'-5751'
		Microlog 25"	5000'-5751'

Complete Attachments A — E listed on the reverse.

CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32).

NAME AND OFFICIAL TITLE *(Please type or print)*
GLENN M. FEDDERSON
Vice President

Deal Form

DATE SIGNED
12/4/84

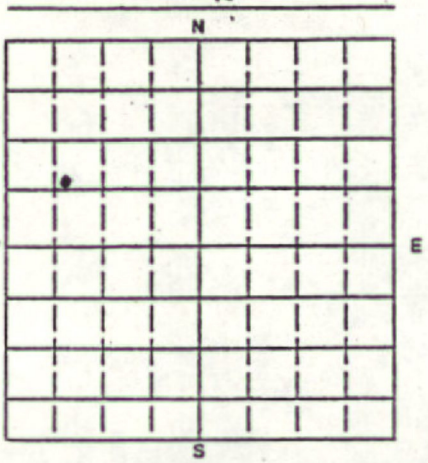
EPA Form 7520-10 (2-84)

WASHINGTON, DC 20460

EPA PLUGGING AND ABANDONMENT PLAN

NAME AND ADDRESS OF FACILITY	NAME AND ADDRESS OF OWNER/OPERATOR
Murphy Oil USA, Inc. Poplar, Montana EPU 59-D	Murphy Oil USA, Inc. 200 Peach St., El Dorado, AR 71730

LOCATE WELL AND OUTLINE UNIT ON SECTION PLAT — 640 ACRES



STATE	COUNTY	PERMIT NUMBER
MT	Roosevelt	

SURFACE LOCATION DESCRIPTION

NE ¼ OF SW ¼ OF NW ¼ SECTION 4 TOWNSHIP 28N RANGE 58E (SJE)

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface Location 1911 ft. from (N/S) N Line of quarter section

and 732 ft. from (E/W) W Line of quarter section

TYPE OF AUTHORIZATION

- ☒ Individual Permit
- ☐ Area Permit
- ☐ Rule

Number of Wells 1

WELL ACTIVITY

- ☐ CLASS I
- ☒ CLASS II
  - ☒ Brine Disposal
  - ☐ Enhanced Recovery
  - ☐ Hydrocarbon Storage
- ☐ CLASS III

Lease Name EPU

Well Number 59-D

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT(LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
13 3/8	48#		139.85	17½
9 5/8	36#		942.83	12¼
5½	15.5 #		5735.36	8 3/4

METHOD OF EMPLACEMENT OF CEMENT PLUGS

- ☒ The Balance Method
- ☒ The Dump Bailer Method
- ☐ The Two-Plug Method
- ☐ Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inches)	*5½	5½	**9 5/8				
Depth to Bottom of Tubing or Drill Pipe (ft.)	3214						
Sacks of Cement To Be Used (each plug)	2	10	10				
Slurry Volume To Be Pumped (cu. ft.)	2	10	10				
Calculated Top of Plug (ft.)	3199	10	20				
Measured Top of Plug (if tagged ft.)							
Slurry Wt. (Lb./Gal.)							
Type Cement or Other Material (Class III)							

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED *(If any)*

From	To	From	To
3337	3365		
4390	3330		
3264	3276		

Estimated Cost to Plug Wells $ 6,000

*Cast iron B.P. will be set at 3214' with 2 sacks of cement on top.

**10 sacks cement will be pumped down 5½" csg annulus. Casing will be cut off 6' below ground and a plate welded on top.

CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE *(Please type or print)*	SIGNATURE	DATE SIGNED
GLENN M. FEDDERSON Vice President		12/4/84

Seal Form

EPA Form 7520-14 (3-84)

EPU #59-D

A. Area of Review

Fixed Radius of 1/4 Mile - Field Plat Attached
No wells within area of review

E. Name and Depth of USDWs (Class II)

Depth	Name	Local Name
86'	Tertiary Sand	Unknown

Fox Hills / Hell Creek do are eroded away.

G. Geological Data

Zone	Name	Description	Depth	Thickness	Frac Pressure
Upper Confining	Skull Creek	Gray Shale w/ Traces of Red Silt	2904±	170±	Unknown 1.00 psi/ft
Injection	*Dakota	White, Fine Grain, Porous Sandstone	3070±	300±	0.74 psi/foot
Lower Confining	Fuson	Dark Gray Shale w/trace of sand	3570±	375±	Unknown

*The Dakota Sand is overlain by the Dakota Silt.

H. Operating Data - Currently Not in Use

(1) Average Injection Volume - 4500 Bbls/Day]
Maximum Injection Volume - 6500 Bbls/Day] - Currently not in use.
(2) Average Injection Pressure - 650 psi]
Maximum Injection Pressure - 800 psi] ---Currently not in use.
(3) Annulus Fluid - Corrosion inhibited fluid
(5) Source of Injection Fluid - Mississippian Formation Fluid produced from the East Poplar Field
(6) Well is not currently used for salt water disposal

M. Schematics Attached

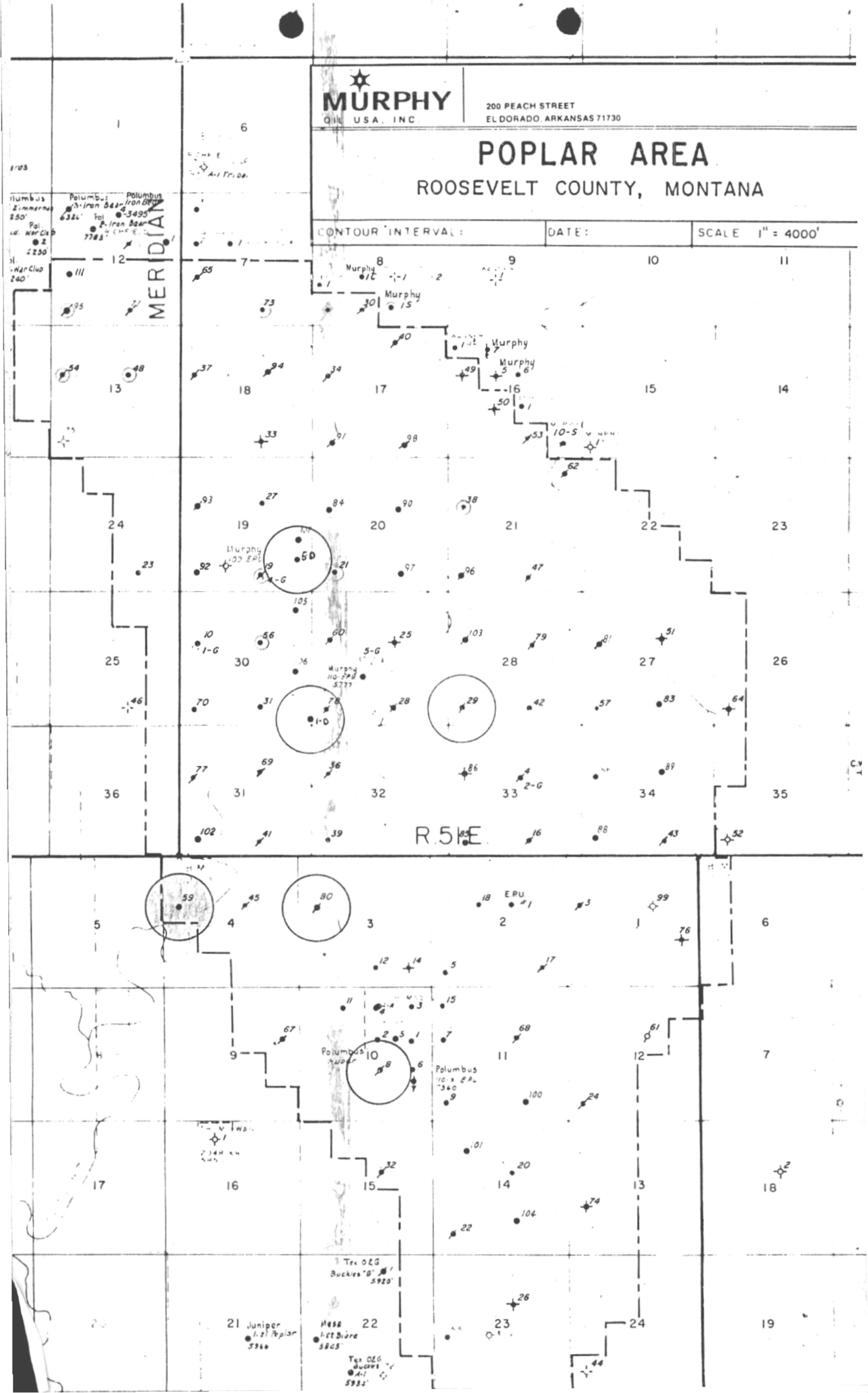
Q. Plugging and Abandonment Plan
EPA Form 7520-14 is attached

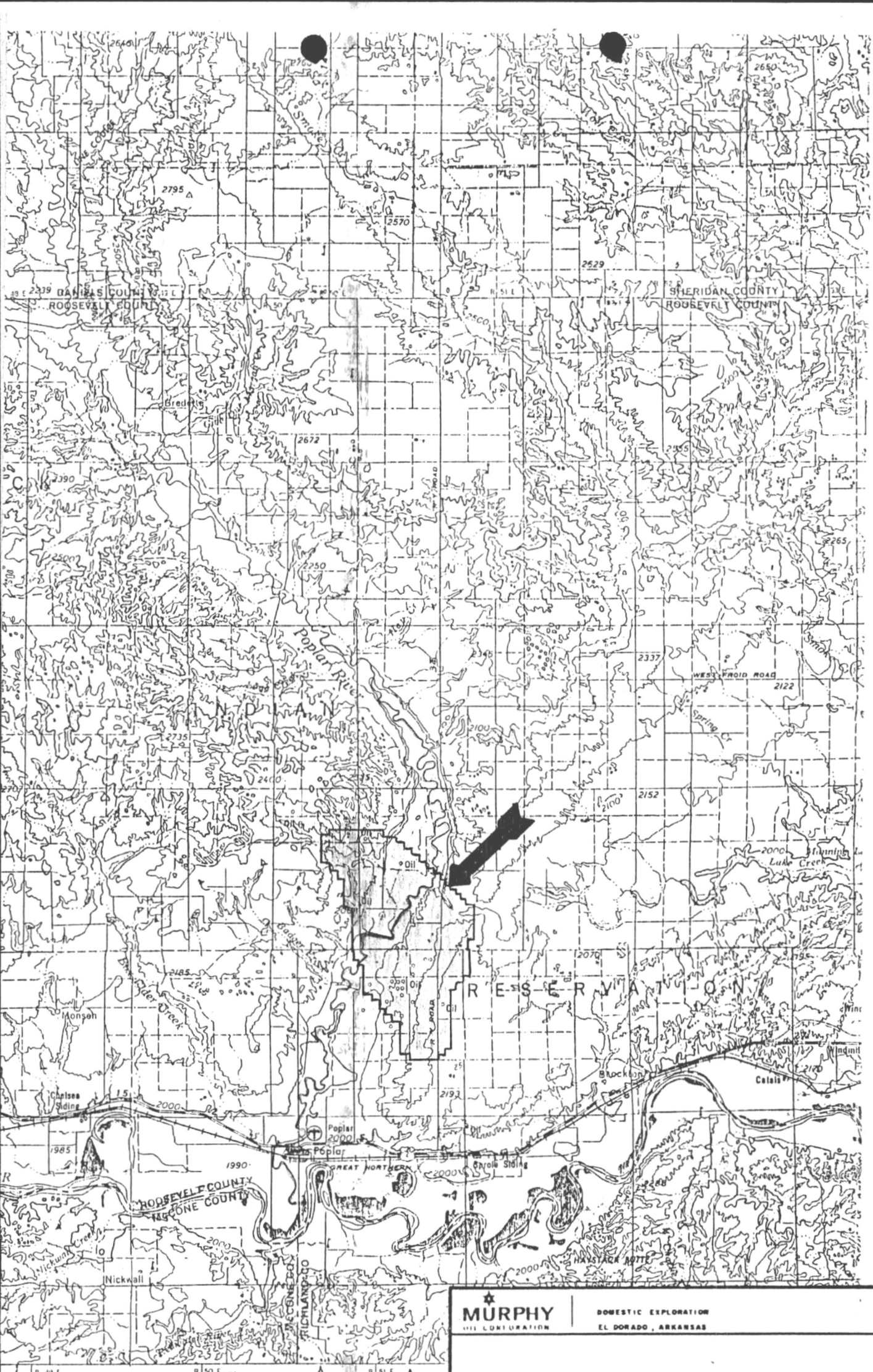
R. Necessary Resources

See attached financial statement

U. Description of Business - EPU Well No. 59-D is used to dispose of part of the produced salt water from the East Poplar Unit wells. The salt water is separated from the produced fluid and comes to the disposal facility at SWD Station No. 1 through closed flowlines. The salt water is held in the salt water storage tanks until the salt water disposal pumps are engaged through automatic level switches. The salt water disposal pumps dispose of the salt water into the tubing of the wellbore and then into the formation.

The produced fluids are mixed in the flowlines and the resulting final TDS is approximately 130,000 TDS.

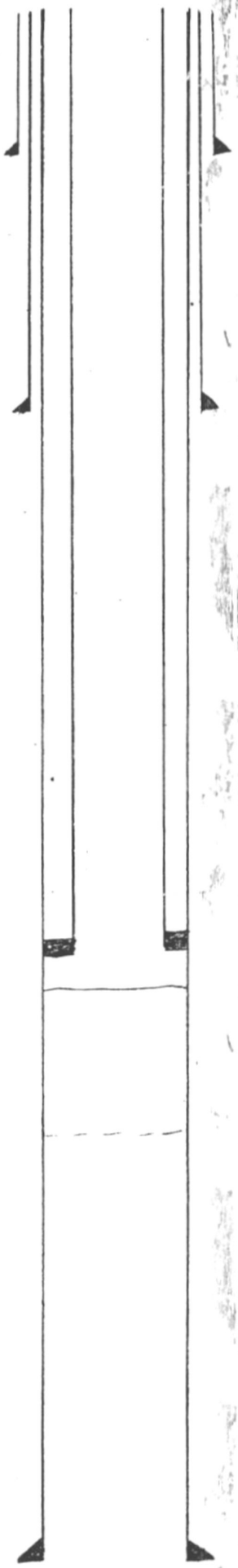

MURPHY
OIL U.S.A. INC.
200 PEACH STREET
EL DORADO, ARKANSAS 71730
POPLAR AREA
ROOSEVELT COUNTY, MONTANA
CONTOUR INTERVAL:
DATE:
SCALE 1" = 4000'
MERIDIAN
R.51E
Murphy
Polumbus
Tex O&G Buckles "B"
Juniper
Mesa



MURPHY OIL CORPORATION | DOMESTIC EXPLORATION
EL DORADO, ARKANSAS

East Poplar Unit
East Poplar Field
Roosevelt County, Montana
Topographic Map
Scale 1:250,000

EPU #59-D Subsurface Well Design



145.85' of 13 3/8", 48#, H-40, 8rd., cemented to surface

948.83' of 9 5/8", 36# cemented to surface with 400 sacks

Set tubing with packer at 3160'

Block squeeze 3194'-3196', 250 sacks cement

Perforations at 3337'-3365', 3290'-3330', 3264'-3276'

Block squeeze 3400'-3402' with 200 sacks

5741.36' of 5½", 15.5# cemented with 300 sacks

Note: Design is not to scale

COPY

FROM
MURPHY CORPORATION
EL DORADO, ARKANSAS

June 22, 1961

P. O. Box 547
Poplar, Montana

United States Geological Survey
P. O. Box 1435
Billings, Montana

Attention: Mr. Hillary A. Oden

Gentlemen:

Attached are four copies of Supplementary Well History on East Poplar Unit Well No. 59.

If this meets with your approval, please return one copy to this office.

Very truly yours,

MURPHY CORPORATION

M. T. James
Field Production Superintendent

MTJ:pm
Attachments

cc: With attachment
Harold Milam - Denver
Leroy Duncan - El Dorado

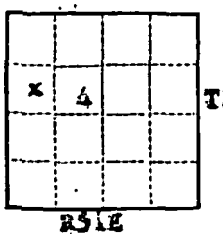
Form 9-331a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Land Office Billings
Lease No. BLM-A-029305-A
Unit East Poplar



SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL		Report of Conversion to Disposal well	XX

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

June 22, 1961

Well No. 59 is located 1911 ft. from {N/S} line and 732 ft. from {E/W} line of sec. 4

SW NW Section 4 (¼ Sec. and Sec. No.) | 28N (Twp.) | 51E (Range) | M.P.M. (Meridian)

East Poplar Field (Field) | Roosevelt (County or Subdivision) | Montana (State or Territory)

The elevation of the derrick floor above sea level is 1998 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

SEE ATTACHED SHEETS

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company Murphy Corporation

Address P. O. Box 347

Poplar, Montana

By _____

Title Field Production Superintendent

U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

WORKOVER HISTORY NO. 3

June 15, 1961

Lease and Well East Poplar Unit Well No. 59

Field East Poplar County Roosevelt State Montana

Well Location SW NW Section 4, T28N, R51E

Status Prior to Present Job:

Date Completed August 8, 1955 (Salt Water Disposal) Date of Last Work-over August 10, 1959 TD 5754' PBTD 5634' Injection Zone B Zone of the Madison Formation Perforations 5600'-5614' and 5621.5'-5628'

Cumulative Injection 3,303,928 thru May 31, 1961

Justification for Workover:

To convert to salt water disposal well to dispose of EPU salt water.

Summary of Workover:

5-31-61 5634' PBTD. Moved in pulling unit to complete as a Dakota Injection well. Pulled tbg to remove Baker cbal assy. Ran tbg with Baker full bore pkr and DR plug. Set DR plug and test same w/3000#. Held O.K. Spot 3 bbls gel on DR plug. Pulled tbg to 3298'. Perf for block squeeze - 3400' to 3402' with Wireline's through tbg gun, 4 holes per ft. Shut well in overnight.

6-1-61 5634' PBTD. Test csg and BOP w/1500#, held. Squeezed perf 3400'-3402' w/50 sx reg cmt, HR-4 retarder added. Broke formation w/5 bbls. Ran 10 bbls fresh wtr ahead of cmt. Pmpd 50 sx cmt out in formation. Max press 400#, would not hold. Cleared tool w/4 bbls wtr and let set 5 hrs. Squeeze #2 w/50 sx reg cmt, HR-4 retarder added. Broke formation w/5 bbls fresh wtr at 1000#. Pmpd 50 sx cmt out in formation, max press 800#, would not hold. Cleared tool w/4 bbls wtr and let set 5 hrs. Squeeze #3 w/50 sx reg cmt, HR-4 retarder added. Broke formation w/5 bbls fresh wtr at 1400#. Pumped 50 sx cmt out in formation. Staged last 5 bbls cmt for 2 hrs and 20 mins. Max press 1400#, would not hold. Cleared tool w/4 bbls wtr and let set overnight.

6-2-61 3375' PBTD. Squeeze #4 w/50 sx reg cmt, HR-4 retarder added. Broke formation w/5 bbls fresh wtr at 2200#. Squeezed 37 sx cmt out in formation. Max squeeze press 3000#, held O.K. Reversed out 13 sx cmt. Let cmt set 4 hrs and test w/1500#, held O.K. Perf 3194' to 3196' for block squeeze above Dakota sand with Wireline's through tbg gun, 4 holes per ft. Set Baker full bore pkr at 3130'. Broke

formation w/5 bbls fresh wtr at 1200#. Squeeze perf 3194' to 3196' w/50 sx reg cmt, HR-4 retarder added. Pmpd 50 sx cmt out in formation. Well circ out 9 5/8" surf csg. Max press 3000#. Would not hold. Cleared tool w/4 bbls wtr. Let cmt set overnight.

6-3-61 3375' PBTD. Squeeze #2 on perf 3194'-96' w/50 sx reg cmt, HR-4 retarder added. Broke formation w/5 bbls fresh wtr at 2000#. Squeezed 32 sx cmt out in formation. Max squeeze press 3400#. Held O.K. Reversed out 18 sx cmt. Pulled tbg and removed Baker full bore pkr. Ran tbg w/4 3/4" bit. Drld out cmt from 3108' to 3200'. Ran tbg to 3375' and circ until clean.

6-4-61 3375' PBTD. Tested top squeeze 3194'-96' w/1400#, would not hold. Made trip and ran retrievable full bore pkr set at 3174'. Squeeze #3 on perf 3194'-96' w/50 sx reg cmt with HR-4 retarder added. Squeezed 43 sx into formation. Staged last 10 sx. Max press 3000#, held. Reversed out 7 sx. Tested w/1500#. After reversing make trip for bit.

6-5-61 3375' PBTD. Drld out med hard cmt 3170' and 3196'. Pressure tested squeeze broke at 1450#. Pump in at 1200#. Made trip for pkr. Squeeze #4 perf 3194'-96'. Pkr set at 3170'. Broke f/ 3500#. Squeezed w/100 sx reg cmt with HR-4 added. 98 sx in formation. Max press 4000#, held. Rev out 5 sx. Job complete at 3:30 P.M., 6-4-61.

6-6-61 3336' PBTD. Tested squeeze job w/1750#, held O.K. Pulled tbg Perf with Wireline dyna jet csg gun 3237' to 3265'; 3268' to 3[illegible], 3264' to 3276'; 4 SPF. Ran Guiberson pkr on 2 7/8" tbg, set pkr at 3160'. Swab tested 2 hrs. Well started flowing. Chlorides 39,000 ppm. Closed well in. Rig down pulling unit.

6-7-61 3365' PBTD. W.L. equals 3375' tbg. Attempted to break down with salt wtr station pumps. Would not break at 1400#. Tbg landed 7.25' below RKB at 3149.45'.

6-8-61 3365' PBTD. Injecting into the Dakota sand at the rate of 3809 BPD at 940 psi. Broke formation with salt wtr at 2700 psi at rate of 5 BPM. Acidized w/1500 gals mud acid and 250 plugging balls. Max inj rate with acid 6.5 BPM at 1800 psi. Ran injection rate:

10,080 BPD at 1300 psi w/Dowell twin pump
7,200 BPD at 1300 psi w/Dowell twin pump
5,760 BPD at 1200 psi w/Dowell twin pump
4,320 BPD at 975 psi w/Dowell twin pump
3,680 BPD at 850-940 psi w/1 station pump

6-9-61 3365' PBTD. Inj at rate of 3809 BPD at 820 psi.

6-10-61 3365' PBTD. Swbd 3 hrs. Pulled swab from 2300'. Fluid level standing at 1800' while swbg. Inj w/1 station pump at rate of 3809 BPD at 780 psi.

6-11-61 3365' PBTD. Inj wtr at the rate of 3809 bpd at 780 psi.

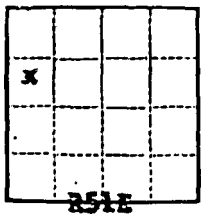
Form 9-881a
(Feb. 1951)

Budget Bureau No. 42-R358.4.
Approval expires 12-31-60.

Land Office Billings

Lease No. SLM-A-029305-A

Unit East Poplar



(SUBMIT IN TRIPLICATE)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL			
Convert to Disposal Well	XX		

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

June 1, 1961

Well No. 39 is located 1911 ft. from {N/S} line and 732 ft. from {E/W} line of sec. 4

SW NW Section 4 | 28N | 51E | M.P.M.
(¼ Sec. and Sec. No.) | (Twp.) | (Range) | (Meridian)

East Poplar Field | Roosevelt | Montana
(Field) | (County or Subdivision) | (State or Territory)

The elevation of the derrick floor above sea level is 1998 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Convert to disposal well to dispose of EPU salt water. Set DE plug in model DA packer @ 5568. Spot jel w/corrosion inhibitor. Perforate and block squeeze 3400-3402 and 3194-3196. Squeeze through retrievable packer. Drill out 3194 (top) squeeze. Perforate the Dakota sand 3342-3370 (28'), 3290-3330 (40'), and 3264-3276 (12'). Total 80'. Swab and water frac w/station pumps.

Temp. verbal approval was obtained from Mr. Watkins of the Montana Oil & Gas Commission on May 26, 1961, and from Mr. Odam of the U.S.G.S. on May 26, 1961. Application for a hearing was made to the Montana Oil & Gas Commission on May 26, 1961.

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company Murphy Corporation

Address P. O. Box 547

Poplar, Montana

By M. T. James

Title Field Production Superintendent

U. S. GOVERNMENT PRINTING OFFICE: 1958 O - 463339

Form No. 2

GENERAL RULES
201, 202, 213,
216, 219, 233.1

(SUBMIT IN QUADRUPLICATE)

TO

OIL AND GAS CONSERVATION COMMISSION
OF THE STATE OF MONTANA
BILLINGS OR SHELBY

NOTICE!
THIS FORM BECOMES A PERMIT WHEN STAMPED APPROVED BY AN AGENT OF THE COMMISSION.

SUNDRY NOTICES AND REPORT OF WELLS

Notice of Intention to Drill		Subsequent Report of Water Shut-off	
Notice of Intention to Change Plans		Subsequent Report of Shooting, Acidizing, Cementing	
Notice of Intention to Test Water Shut-off		Subsequent Report of Altering Casing	
Notice of Intention to Redrill or Repair Well		Subsequent Report of Redrilling or Repair	
Notice of Intention to Shoot, Acidize, or Cement		Subsequent Report of Abandonment	
Notice of Intention to Pull or Alter Casing		Supplementary Well History	
Notice of Intention to Abandon Well		Report of Fracturing	
Convert to Disposal Well	XX		

(Indicate Above by Check Mark Nature of Report, Notice, or Other Data)

June 1, 19 61

Following is a {notice of intention to do work} on land {owned / leased} described as follows:

LEASE BLM-A-029305-A

MONTANA (State) Roosevelt (County) East Poplar (Field)

Well No. 59 SW NW Section 4 (m. sec.) 28E (Township) 51E (Range) M.P.M. (Meridian)

The well is located 1911 ft. from {N / S} line and 732 ft. from {E / W} line of Sec. 4

(Locate accurately on Plat on back of this form the well location, and show lease boundary.)

The elevation of the derrick floor above the sea level is 1998'.

READ CAREFULLY — DETAILS OF PLAN OF WORK — READ CAREFULLY

(State names of and expected depths to objective sands; show size, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work, particularly all details results Shooting, Acidizing, Fracturing.)

DETAILS OF WORK
RESULT

Convert to disposal well to dispose of EPU salt water. Set BR plug in model DA packer @ 5568. Spot jel w/corrosion inhibitor. Perforate and block squeeze 3400-3402 and 3194-3196. Squeeze through retrievable packer. Drill out 3194 (top) squeeze. Perforate the Dakota sand 3342-3370 (28'), 3290-3330 (40'), and 3264-3276 (12'). Total 80'. Swab and water frac w/station pumps. Temp. verbal approval was obtained from Mr. Watkins of the Montana Oil & Gas Commission on May 26, 1961. Application for a hearing was made to the Montana Oil & Gas Commission on May 26, 1961.

Temp. verbal approval received from Mr. Oden, U.S.G.S., May 26, 1961.

Approved subject to conditions on reverse of form

Date

By
Title
District Office Agent

Company MURPHY CORPORATION

By M. H. Jones

Title Field Production Superintendent

Address Box 547, Poplar, Montana

NOTE:—Reports on this Form to be submitted to the District Agent for Approval in Quadruplicate.

10M

OVER

MURPHY
OIL USA, INC.

200 PEACH STREET
EL DORADO, ARKANSAS 71730

November 16, 1984

Mr. Angus Campbell
United States Environmental Protection Agency
Region VIII
1860 Lincoln Street
Denver, Colorado 80295-0699

Underground Injection Control (UIC) Permit Application for: East Poplar Field Well Nos. 1-D, 5-D, 8-D, 29-D, 59-D, 80-D

Dear Mr. Campbell:

This is to confirm the November 16 approval by telephone of the extension of the filing deadline to December 10, 1984 of information requested by Mr. Max Dodson's letter concerning deficiencies in our East Poplar Field UIC permit applications.

We will answer the deficiencies by the December 10, 1984 deadline. Your cooperation in this matter is appreciated.

Yours very truly,

Sidney W. Campbell

Sidney W. Campbell
Sr. Petroleum Engineer

SWC/ac

Bill

MURPHY
OIL USA, INC.

200 PEACH STREET
EL DORADO, ARKANSAS 71730

July 31, 1984

AUG 3 1984

REGL.

Mr. John F. Wardell, Director
Environmental Protection Agency
Region 8, Montana Office
Federal Building
301 S. Park, Drawer 10096
Helena, Montana 59626

Dear Mr. Wardell:

We have received your request for permit applications on our East Poplar Unit salt water disposal wells. You have asked that these be filed by July 30, 1984. Based on our current schedule it appears that the applications cannot be completed by this date and it is my understanding that Mr. Bill Engle of your office has given our Mr. Sidney Campbell approval to extend the deadline for applying to August 31. We would appreciate your confirming that the filing deadline of August 31, 1984, is satisfactory.

As you have suggested, we currently plan to file permit applications for all of our salt water disposal wells by the August 31, 1984, date. Your cooperation in this matter is appreciated.

Yours very truly,

Alvin W. Simpson
Manager of Operations

AWS/ac
cc: Mr. Ray Reede
Murphy Oil USA, Inc.
Poplar, Montana

AUG 06 1984

MONTANA OFFICE

SPUR

MURPHY
OIL USA, INC.

200 PEACH STREET
EL DORADO, ARKANSAS 71730

August 27, 1984

Chief, Drinking Water Branch
U.S. Environmental Protection Agency (8WM-DW)
1860 Lincoln Street
Denver, Colorado 80295

Dear Sir:

Enclosed are the applications requested by Mr. John F. Wardell, Director, Montana Office of the EPA.

The applications enclosed are for East Poplar Field, wells 59-D, 1-D, 5-D, 29-D, 8-D, and 80-D. There is a Murphy Oil Corporation Annual Report which is the financial statement referred to in each application.

We have indicated on each application the election of an individual well permit; however, we would like to request an area or field wide permit for the Dakota (Fall River) and for Judith River zones.

We hope the applications are complete for permitting procedures; however, if you have any questions please contact Mr. Sidney W. Campbell at (501) 862-6411. Also we would like to file applications on our other fields at a later date. Please let us know when these need to be filed.

Yours very truly,

Alvin W. Simpson/SWC

Alvin W. Simpson
Manager of Operations

AWS/ac
cc: John F. Wardell
Ray Reede

Form 4 UIC

EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

UNDERGROUND INJECTION CONTROL PERMIT APPLICATION

(Collected under the authority of the Safe Drinking Water Act, Sections 1421, 1422, 40 CFR 144)

I. EPA ID NUMBER

		T/A	C
U	MTS21PE-0025		

READ ATTACHED INSTRUCTIONS BEFORE STARTING

FOR OFFICIAL USE ONLY

Application approved (mo day year)	Date Received (mo day year)	Permit/Well Number	Comments
		EPU 59-D	

II. FACILITY NAME AND ADDRESS

Facility Name: East Poplar Unit

Street Address: P. O. Box 547

City: Poplar | State: MT | ZIP Code: 59255

III. OWNER/OPERATOR AND ADDRESS

Owner/Operator Name: Murphy Oil USA, Inc.

Street Address: 200 Peach Street

City: El Dorado | State: AR | ZIP Code: 71730

IV. OWNERSHIP STATUS (Mark 'x')

☐ A. Federal ☐ B. State ☒ C. Private

☐ D. Public ☐ E. Other (Explain)

V. SIC CODES

1311

VI. WELL STATUS (Mark 'x')

☒ A. Operating — Date Started: mo 6, day 11, year 61

☒ B. Modification/Conversion ☐ C. Proposed

Permitting Existing Well Approved by Rule

VII. TYPE OF PERMIT REQUESTED (Mark 'x' and specify if required)

☒ A. Individual ☐ B. Area

Number of Existing wells:

Number of Proposed wells:

Name(s) of field(s) or project(s): East Poplar Unit

VIII. CLASS AND TYPE OF WELL (see reverse)

A. Class(es) (enter code(s))	B. Type(s) (enter code(s))	C. If class is "other" or type is code 'x,' explain	D. Number of wells per type (if area permit)
11-D			

IX. LOCATION OF WELL(S) OR APPROXIMATE CENTER OF FIELD OR PROJECT

C	A. Latitude Deg	Min	Sec	B. Longitude Deg	Min	Sec	Township and Range Twsp	Range	Sec	¼ Sec	Feet from	Line	Feet from	Line
I							28N	51E	4	NW	1911	N	732'	W

X. INDIAN LANDS (Mark 'x')

☒ Yes ☐ No

XI. ATTACHMENTS

(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)

FOR CLASSES I, II, III (and other classes) complete and submit on separate sheet(s) Attachments A — U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application:

XII. CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

A. Name and Title (Type or Print)

Alvin W. Simpson
Manager of Operations

B. Phone No. (Area Code and No.)

501-862-6411

C. Signature

Alvin W. Simpson /swc

RECEIVED
AUG 29 1984

D. Date Signed

August 28, 1984

EPA REGION VIII
DRINKING WATER BRANCH

EPU #59-D

A. Fixed Radius of 1/4 Mile
No wells within area of review

E. Name and Depth of USDWs (Class II)

Depth	Name	Local Name
86'	Tertiary Sand	Unknown

G. Geological Data

Zone	Name	Description	Depth	Thickness	Frac Pressur
Upper Confining	Skull Creek	Gray Shale w/ Traces of Red Silt	2904±	170±	Unknown
Injection	Dakota	White, Fine Grain, porous Sandstone	3070±	300±	Unknown
Lower Confining	Fuson	Dark Gray Shale w/trace of sand	3570±		Unknown

H. Operating Data - Currently Not in Use

(1) Average Injection Rate - 4500 Bbls/Day
Maximum Injection Rate - 6500 Bbls/Day
(2) Average Injection Pressure - 650 psi
Maximum Injection Pressure - 800 psi
(3) Annulus Fluid - Corrosion inhibited fluid
(5) Source of Injection Fluid - Mississippian Formation Fluid produced from the East Poplar Field

Q. Plugging and Abandonment Plan
EPA Form 7520-14 is attached

R. Necessary Resources

See attached financial statement

U. Description of Business - Murphy Oil USA, Inc. is an oil and gas Exploration and Development Company with refining and marketing assetts.

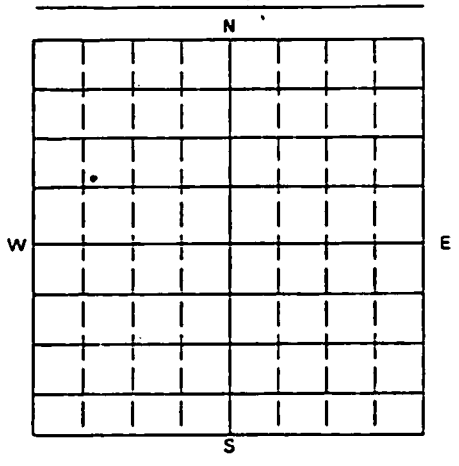
WASHINGTON, DC 20460

EPA PLUGGING AND ABANDONMENT PLAN

NAME AND ADDRESS OF FACILITY
Murphy Oil USA, Inc.
Poplar, Montana
EPU 59-D

NAME AND ADDRESS OF OWNER/OPERATOR
Murphy Oil USA, Inc.
200 Peach St., El Dorado, AR 71730

LOCATE WELL AND OUTLINE UNIT ON SECTION PLAT — 640 ACRES



STATE	COUNTY	PERMIT NUMBER
MT	Roosevelt	

SURFACE LOCATION DESCRIPTION
NE ¼ OF SW ¼ OF NW ¼ SECTION 4 TOWNSHIP 28N RANGE 58E

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT
Surface Location 1911 ft. from (N/S) N Line of quarter section
and 732 ft. from (E/W) W Line of quarter section

TYPE OF AUTHORIZATION
- ☐ Individual Permit
- ☐ Area Permit
- ☐ Rule

Number of Wells ____

WELL ACTIVITY
- ☐ CLASS I
- ☒ CLASS II
  - ☒ Brine Disposal
  - ☐ Enhanced Recovery
  - ☐ Hydrocarbon Storage
- ☐ CLASS III

Lease Name EPU
Well Number 59-D

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT(LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
13 3/8	48#		139.85	17½
9 5/8	36#		942.83	12¼
5½	15.5		5735.36	8 3/4

METHOD OF EMPLACEMENT OF CEMENT PLUGS
- ☒ The Balance Method
- ☒ The Dump Bailer Method
- ☐ The Two-Plug Method
- ☐ Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inches)	*5½	5½	9 5/8				
Depth to Bottom of Tubing or Drill Pipe (ft.)	3214						
Sacks of Cement To Be Used (each plug)	2	10	10				
Slurry Volume To Be Pumped (cu. ft.)	2	10	10				
Calculated Top of Plug (ft.)	3195	10	20				
Measured Top of Plug (if tagged ft.)							
Slurry Wt. (Lb./Gal.)							
Type Cement or Other Material (Class III)							

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (If any)

From	To	From	To
3337	3365		
4390	3330		
3264	3276		

Estimated Cost to Plug Wells *Cast iron B.P. will be set at 3214'
10 sacks cement will be pumped down 5½" csg annulus

CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

NAME AND OFFICIAL TITLE (Please type or print)	SIGNATURE	DATE SIGNED
Alvin W. Simpson Manager of Operations		

EPA Form 7520-14 (3-84)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

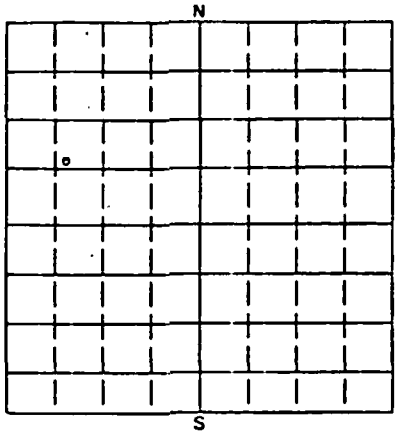
EPA COMPLETION REPORT FOR BRINE DISPOSAL, HYDROCARBON STORAGE, OR ENHANCED RECOVERY WELL

Form Approved
OMB No. 2040-0042
Approval expires 9-30-86

NAME AND ADDRESS OF EXISTING PERMITTEE
Murphy Oil USA, Inc.
200 Peach St.
El Dorado, AR 71730
EPU 59-D

NAME AND ADDRESS OF SURFACE OWNER
Submarginal Land
BIA
Poplar, Montana

LOCATE WELL AND OUTLINE UNIT ON SECTION PLAT — 640 ACRES



STATE	COUNTY	PERMIT NUMBER
MT	Roosevelt	

SURFACE LOCATION DESCRIPTION
NE ¼ OF SW ¼ OF NW ¼ SECTION 4 TOWNSHIP 20N RANGE 51E

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT
Surface Location 1911 ft. from (N/S) N Line of quarter section
and 732 ft. from (E/W) W Line of quarter section

WELL ACTIVITY
- [X] Brine Disposal
- [ ] Enhanced Recovery
- [ ] Hydrocarbon Storage

TYPE OF PERMIT
- [X] Individual
- [ ] Area
  Number of Wells ____

Estimated Fracture Pressure of Injection Zone Unknown

Anticipated Daily Injection Volume (Bbls)		Injection Interval	
Average	Maximum	Feet	to Feet
Not In Use		3264	3342
Anticipated Daily Injection Pressure (PSI)		**Depth to Bottom of Lowermost Freshwater Formation (Feet)**	
Average	Maximum	Bud Lien's Deepest Well is 86'	

Type of Injection Fluid *(Check the appropriate block(s))*
- [X] Salt Water
- [ ] Brackish Water
- [ ] Fresh Water
- [ ] Liquid Hydrocarbon
- [ ] Other

Lease Name: EPU
Well Number: 59-D
Name of Injection Zone: Dakota Sand

Date Drilling Began	Date Well Completed
6-23-55	8-8-55

Permeability of Injection Zone: Data Not Available

Date Drilling Completed: 7-16-55

Porosity of Injection Zone: Data Not Available

CASING AND TUBING			CEMENT		HOLE	
OD Size	Wt/Ft — Grade — New or Used	Depth	Sacks	Class	Depth	Bit Diameter
13 3/8	48# H-40 New	145.85	200	G?	150'	17½
9 5/8	36# H-40 New	948.83	400	G?	965'	12¼
5 1/2	15.5 J-55 New	5741.36	300	G?	5754'	8 3/4
	Block Squeeze		450	G?	3400'	
2 7/8	6.5# J-55 New	3160'				

INJECTION ZONE STIMULATION		WIRE LINE LOGS, LIST EACH TYPE	
Interval Treated	Materials and Amount Used	Log Types	Logged Intervals
3264-3365	1500 gals mud acid	Elect Survey 2"	962' - 5753'
		Elect Survey 5"	2000'-5753'
		Microlog 5"	2000'-5751'
		Microlog 25"	5000'-5751'

Complete Attachments A — E listed on the reverse.

CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32).

NAME AND OFFICIAL TITLE *(Please type or print)*		DATE SIGNED
Alvin W. Simpson Manager of Operations		

EPA Form 7520-10 (2-84)

ATTACHMENTS

A. Present a schematic or other appropriate drawings of the surface and subsurface construction details of the well as built.

B. Describe the method and results of mechanical integrity testing.

C. Present the results of that portion of those logs, tests, and cores which specifically relate to (1) underground sources of drinking water and the confining zone(s) and (2) the injection and adjacent formations.

D. Present the status of corrective action on defective wells in the area of review.

E. Provide to EPA, with the completion report, one final print of all geophysical logs run.

Form Approved. OMB No. 2000-0042
Approval expires 9-30-86

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

EPA

COMPLETION FORM FOR INJECTION WELLS

ADMINISTRATIVE INFORMATION

1. Permittee

Murphy Oil USA, Inc.

Address *(Permanent Mailing Address) (Street, City, State, and ZIP Code)*

P. O. Box 547, Poplar, Montana 59255 (District Office)
200 Peach Street, El Dorado, Arkansas 71730 (Home Office)

2. Operator

Murphy Oil USA, Inc.

Address *(Street, City, State, and ZIP Code)*

Same as above

3. Facility Name

East Poplar Unit 59-D

Telephone Number

District Office 406-768-3611
Home Office 501-862-6411

Address *(Street, City, State, and ZIP Code)*

Murphy Oil USA, Inc. (District Office)
P. O. Box 547
Poplar, Montana 59255

4. Surface Location Description of Injection Well(s)

State	County
Montana	Roosevelt

¼ of	¼ of	¼ section
	SW	NW 4

Township	Range
28N	51E

Feet from (N/S)	Line of quarter section and
1911	N

Feet from (E/W)	Line of quarter section
732'	W

Submit with this Completion Form the attachments listed in *Attachments for Completion Form.*

CERTIFICATION

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32).

NAME AND OFFICIAL TITLE *(Please type or print)*	SIGNATURE	DATE SIGNED
Alvin W. Simpson Manager of Operations		

CONTINUED ON REVERSE

Attachments to be submitted with the Completion report:

I. Geologic Information

1. Lithology and Stratigraphy

A. Provide a geologic description of the rock units penetrated by name, age, depth, thickness, and lithology of each rock unit penetrated.

B. Provide a description of the injection unit.

(1) Name
(2) Depth (drilled)
(3) Thickness
(4) Formation fluid pressure
(5) Age of unit
(6) Porosity (avg.)
(7) Permeability
(8) Bottom hole temperature
(9) Lithology
(10) Bottom hole pressure
(11) Fracture pressure

C. Provide chemical characteristics of formation fluid (attach chemical analysis).

D. Provide a description of freshwater aquifers.

(1) Depth to base of fresh water (less than 10,000 mg/1 TDS).

(2) Provide a geologic description of aquifer units with name, age, depth, thickness, lithology, and average total dissolved solids.

II. Well Design and Construction

1. Provide data on surface, intermediate, and long string casing and tubing. Data must include material, size, weight, grade, and depth set.

2. Provide data on the well cement, such as type/class, additives, amount, and method of emplacement.

3. Provide packer data on the packer (if used) such as type, name and model, setting depth, and type of annular fluid used.

4. Provide data on centralizers to include number, type and depths.

5. Provide data on bottom hole completions.

6. Provide data on well stimulation used.

III. Description of Surface Equipment

1. Provide data and a sketch of holding tanks, flow lines, filters, and injection pump

IV. Monitoring Systems

1. Provide data on recording and nonrecording injection pressure gauges, casing-tubing annulus pressure gauges, injection rate meters, temperature meters, and other meters or gauges.

2. Provide data on constructed monitor wells such as location, depth, casing diameter, method of cementing, etc.

V. Logging and Testing Results

Provide a descriptive report interpreting the results of geophysical logs and other tests. Include a description and data on deviation checks run during drilling.

VI. Provide an as-built diagrammatic sketch of the injection well(s) showing casing, cement, tubing, packer, etc., with proper setting depths. The sketch should include well head and gauges.

VII. Provide data demonstrating mechanical integrity pursuant to 40 CFR 146.08.

VIII. Report on the compatibility of injected wastes with fluids and minerals in both the injection zone and the confining zone.

IX. Report the status of corrective action on defective wells in the area of review.

X. Include the anticipated maximum pressure and flow rate at which injection will operate.

YAPUNCICH, SANDERSON & BROWN

LABORATORIES

PHONE 252-6325 P. O. BOX 593 13 NO. 32nd ST.
BILLINGS, MONTANA 59103

File
E. Poplar Unit
Water Analysis Data

Murphy Oil Corporation
200 Jefferson Avenue
El Dorado, Arkansas 71730

DATE 3-02-76
INVOICE NO. 14121
YOUR ORDER NO.

TERMS: NET 30 DAYS

LAB. NO.	SERVICE	AMOUNT
12700	Routine Water Analysis, 5 Samples @ $35.00/Sample	$ 175.00
	Evaporation for Salt, 5 Samples	25.00
		$ 200.00

Madison Formation
North End of East Poplar Unit, Roosevelt County, Montana

1. EP Unit No. 48 Wellhead Temperature 130°F C Zone
2. EP Unit No. 21 Wellhead Temperature 195°F C Zone
3. EP Unit No. 84 Wellhead Temperature 155°F C Zone
4. Composite Sample Well No. 19 Wellhead Temp. 155°F A Zone
   Well No. 38 Wellhead Temp. 175°F A Zone
   Well No. 95 Wellhead Temp. 100°F A Zone
5. Composite Sample "B" Zone
   Well No. 54 Wellhead Temp. 140°F
   Well No. 56 Wellhead Temp. 135°F
   Well No. 73 Wellhead Temp. 145°F

Received 2-26-76
Ordered by O.Paul Doyle

NO FURTHER STATEMENT WILL BE RENDERED UNLESS REQUESTED

YAPUNCICH, SANDERSON & BROWN LABORATORIES

P. O. BOX 593
59103

BILLINGS, MONTANA

13 N. 32ND ST.

WATER ANALYSIS REPORT

Lab. No. 12700-1

Field North End of East Poplar Unit County Roosevelt State Montana
Well No. EP Unit No. 48 Location
Formation Madison "C" Zone Depths
Operator Murphy Oil Corporation Date Sampled
DST No. Sample Date Analyzed 3-01-76
Other Data Wellhead Temperature 130°F

Clear, colorless water; H_2S present.

Constituents	PPM	MEQ.	MEQ. %
Sodium	9,673	420.74	43.15
Calcium	1,002	50.00	5.13
Magnesium	204	16.80	1.72
Sulfate	1,223	25.44	2.61
Chloride	16,170	455.99	46.76
Carbonate	0	0.00	0.00
Bicarbonate	372	6.10	0.63

Chloride as NaCl 25,664 PPM.

Total Solids in Parts per Million

By evaporation
After ignition
Calculated 28,455

pH 7.3

Specific Gravity @ 60°F 1.017

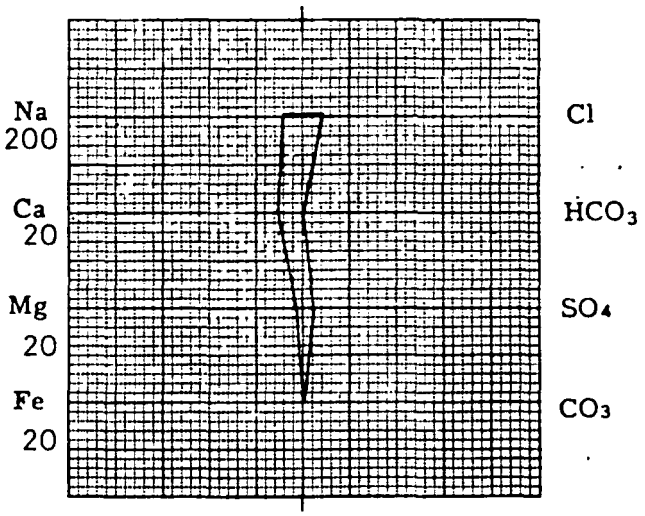
Resistivity @ 68°F
ohms/meter³ 0.25

Total Solids From Resistivity as NaCl 27,791 PPM.

NOTE: Sodium and potassium reported as sodium. MEQ. = milliequivalents per liter PPM = parts per million (milligrams per liter). 1 PPM equivalent to 0.0001%

WATER ANALYSIS PATTERN

Scale MEQ. Per Unit



YAPUNCICH, SANDERSON & BROWN LABORATORIES

P. O. BOX 593
59103

BILLINGS, MONTANA

13 N. 32ND ST.

WATER ANALYSIS REPORT

Lab. No. 12700-2

Field North End of East Poplar Unit County Roosevelt State Montana
Well No. EP Unit No. 21 Location
Formation Madison "C" Zone Depths
Operator Murphy Oil Corporation Date Sampled
DST No. Sample Date Analyzed 3-01-76
Other Data Wellhead Temperature 195°F

Clear, colorless water; H_2S present.

Constituents	PPM	MEQ.	MEQ. %
Sodium	19,261	837.80	46.88
Calcium	842	42.00	2.35
Magnesium	168	13.83	0.77
Sulfate	1,486	30.92	1.73
Chloride	30,380	856.72	47.93
Carbonate	0	0.00	0.00
Bicarbonate	366	6.00	0.34

Total Solids in Parts per Million
By evaporation
After ignition
Calculated 52,317

pH 7.7

Specific Gravity@ 60°F 1.039

Resistivity @ 68°F
ohms/meter 0.16

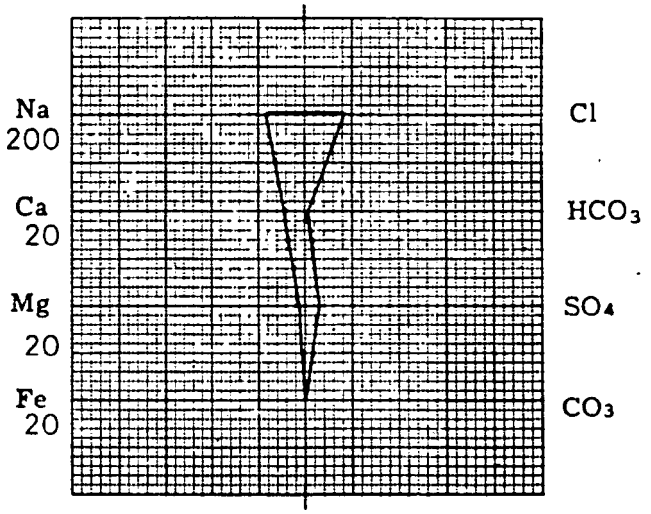
Chloride as NaCl 50,097 PPM.

Total Solids From Resistivity as NaCl 51,522 PPM.

NOTE: Sodium and potassium reported as sodium. MEQ. = milliequivalents per liter PPM = parts per million (milligrams per liter). 1 PPM equivalent to 0.0001%

WATER ANALYSIS PATTERN

Scale MEQ. Per Unit



YAPUNCICH, SANDERSON & BROWN LABORATORIES

P. O. BOX 593
59103

BILLINGS, MONTANA

13 N. 32ND ST.

WATER ANALYSIS REPORT

Lab. No. 12700-3

Field North End of East Poplar Unit County Roosevelt State Montana
Well No. EP Unit No. 84 Location
Formation Madison "C" Zone Depths
Operator Murphy Oil Corporation Date Sampled
DST No. Sample Date Analyzed 3-01-76
Other Data Wellhead Temperature 155°F

Clear, colorless water; H_2S present.

Constituents	PPM	MEQ.	MEQ. %
Sodium	17,485	760.54	46.74
Calcium	802	40.00	2.46
Magnesium	156	12.85	0.79
Sulfate	1,585	32.97	2.03
Chloride	27,440	773.81	47.57
Carbonate	0	0.00	0.00
Bicarbonate	403	6.60	0.41

Chloride as NaCl 45,249 PPM.

Total Solids in Parts per Million

By evaporation
After ignition
Calculated 47,666

pH 7.9

Specific Gravity @ 60°F 1.036

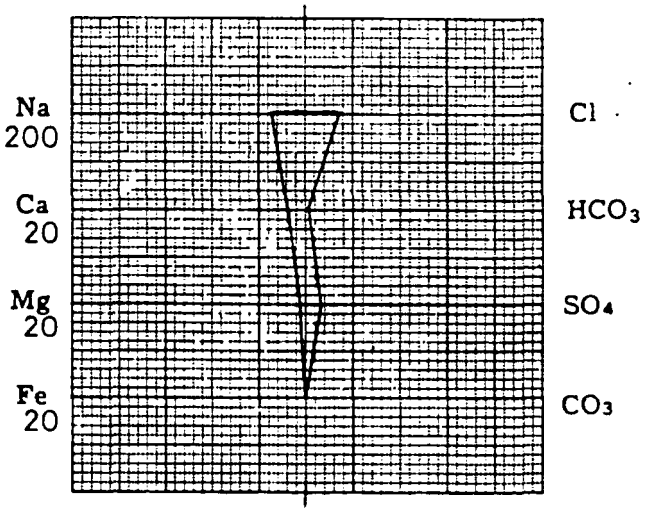
Resistivity @ 68°F
ohms/meter³ 0.16

Total Solids From Resistivity as NaCl 46,817 PPM.

NOTE: Sodium and potassium reported as sodium. MEQ. = milliequivalents per liter PPM = parts per million (milligrams per liter). 1 PPM equivalent to 0.0001%

WATER ANALYSIS PATTERN

Scale MEQ. Per Unit



YAPUNCICH, SANDERSON & BROWN LABORATORIES

P. O. BOX 593
59103

BILLINGS, MONTANA

13 N. 32ND ST.

WATER ANALYSIS REPORT

Lab. No. 12700-4

Field North End of East Poplar Unit County Roosevelt State Montana
Well No. *
Location
Formation Madison "A" Zone
Depths
Operator Murphy Oil Corporation
Date Sampled
DST No. Sample
Date Analyzed 3-01-76
Other Data *Wellhead Temperature 155°F Well No. 19
*Wellhead Temperature 175°F Well No. 38
*Wellhead Temperature 100°F Well No. 95
Clear, colorless water; H_2S present

Constituents	PPM	MEQ.	MEQ. %
Sodium	57,198	2,487.96	49.00
Calcium	802	40.00	0.79
Magnesium	132	10.87	0.21
Sulfate	2,221	46.19	0.91
Chloride	88,200	2,487.24	48.98
Carbonate	0	0.00	0.00
Bicarbonate	329	5.40	0.11

Total Solids in Parts per Million

By evaporation
After ignition
Calculated 148,715

pH 7.4

Specific Gravity @ 60°F 1.102

Resistivity @ 68°F
ohms/meter³ 0.065

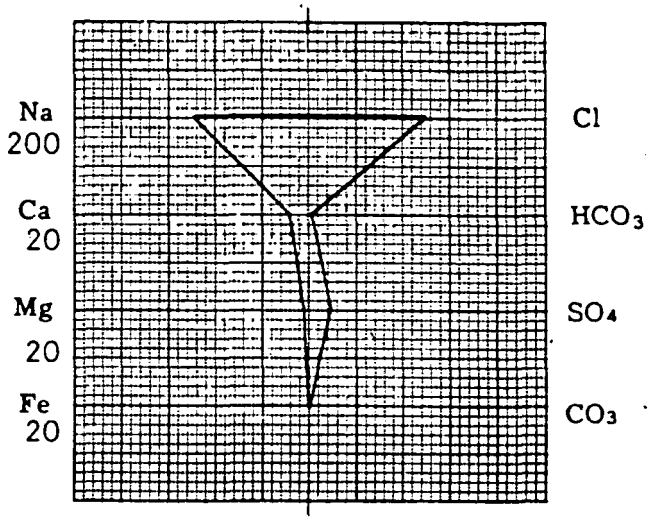
Chloride as NaCl 145,442 PPM.

Total Solids From Resistivity as NaCl 147,557 PPM.

NOTE: Sodium and potassium reported as sodium. MEQ. = milliequivalents per liter. PPM parts per million (milligrams per liter). 1 PPM equivalent to 0.0001%

WATER ANALYSIS PATTERN

Scale MEQ. Per Unit



YAPUNCICH, SANDERSON & BROWN LABORATORIES

P. O. BOX 593
59103

BILLINGS, MONTANA

13 N. 32ND ST.

WATER ANALYSIS REPORT

Lab. No. 12700-5

Field North End of East Poplar Unit County Roosevelt State Montana
Well No. *
Location
Formation Madison "B" Zone
Depths
Operator Murphy Oil Corporation
Date Sampled
DST No. Sample
Date Analyzed 3-01-76
Other Data *Wellhead Temperature 140°F Well No. 54
*Wellhead Temperature 135°F Well No. 56
*Wellhead Temperature 145°F Well No. 73
Clear, colorless water.

Constituents	PPM	MEQ.	MEQ. %
Sodium	83,699	3,640.67	47.17
Calcium	3,607	180.00	2.33
Magnesium	469	38.53	0.50
Sulfate	755	15.70	0.20
Chloride	136,220	3,841.40	49.77
Carbonate	0	0.00	0.00
Bicarbonate	128	2.10	0.03

Total Solids in Parts per Million

By evaporation
After ignition
Calculated 224,813

pH 7.0

Specific Gravity@ 60°F 1.144

Resistivity @ 68°F
ohms/meter³ 0.050

Chloride as NaCl 224,627 PPM.

Total Solids From Resistivity as NaCl 224,417 PPM.

NOTE: Sodium and potassium reported as sodium. MEQ. = milliequivalents per liter. PPM = parts per million (milligrams per liter). 1 PPM equivalent to 0.0001%

WATER ANALYSIS PATTERN

Scale MEQ. Per Unit